Claims

What is claimed is:

1. A device, comprising:

a fiber having a side surface formed on fiber cladding where an evanescent field of guided light in said fiber exists; and

a whispering gallery mode cavity formed on said side surface to support one or more whispering gallery modes and configured to evanescently extract energy in light guided in said fiber into a whispering gallery mode.

2. The device as in claim 1, where said whispering gallery mode cavity includes a bottom cladding layer directly in contact with said side surface, a cavity layer formed on said bottom cladding layer, and a top cladding layer on said cavity layer, and wherein said cavity layer has an index higher than said top and said bottom cladding layers.

3. The device as in claim 1, wherein said whispering gallery mode cavity is a ring which is parallel to said side surface.

4. The device as in claim 1, wherein said whispering gallery mode cavity is a disk which is parallel to said side surface.

5. The device as in claim 1, further comprising a second whispering gallery mode cavity formed on said side surface to evanescently couple to said fiber, wherein said second whispering gallery mode cavity is spatially close to said whispering gallery mode cavity to allow for evanescent coupling with said whispering gallery mode cavity.

6. The device as in claim 1, further comprising a dump waveguide coupled to said whispering gallery mode cavity to evanescently couple light in said whispering gallery mode out of said whispering gallery mode cavity.

7. The device as in claim 1, wherein said whispering gallery mode cavity is located off a center of a fiber core of said fiber.

8. The device as in claim 1, further comprising a sensing unit coupled to said fiber to receive light guided in said fiber and to measure a change in optical coupling between said

whispering gallery mode cavity and said fiber due to an environmental change.

9. The device as in claim 1, wherein said sensing unit comprises a processing unit to process the measured change to extract information on a temperature.

10. The device as in claim 1, wherein said sensing unit comprises a processing unit to process the measured change to extract information on a pressure.

11. The device as in claim 1, wherein said sensing unit comprises a processing unit to process the measured change to extract information on a refractive index of an external medium surrounding said whispering gallery mode cavity.

12. A device, comprising:

an optical waveguide having a side surface where an evanescent field of guided light in said waveguide is present; and

a whispering gallery mode cavity formed on said side surface to support one or more whispering gallery modes and configured to evanescently extract energy in light guided in said waveguide into a whispering gallery mode.

13. The device as in claim 12, further comprising a second whispering gallery mode cavity formed on said side surface to evanescently couple to said waveguide.

14. The device as in claim 13, wherein said second whispering gallery mode cavity is spatially close to said whispering gallery mode cavity to allow for evanescent coupling with said whispering gallery mode cavity.

15. The device as in claim 14, further comprising third and fourth whispering gallery mode cavities both coupled to said side surface to evanescently couple to said waveguide, wherein said third and fourth whispering gallery mode cavities are close to each other to be optically coupled to each other via evanescent coupling.

16. The device as in claim 15, wherein said first and said second whispering gallery mode cavities are spaced from said third and said fourth whispering gallery mode cavities so that said first and said second whispering gallery mode cavities do not directly optically couple with said third and said fourth whispering gallery mode cavities.

17. The device as in claim 13, wherein said second whispering gallery mode cavity is spaced from said first whispering gallery mode cavity and is not in direct optical coupling with said first whispering gallery mode cavity, and wherein said second whispering gallery mode cavity has a resonance wavelength different from a resonance wavelength in said first whispering gallery mode cavity.

18. The device as in claim 12, further comprising a sensing unit coupled to said waveguide to receive light guided in said fiber and to measure a change in optical coupling between said whispering gallery mode cavity and said waveguide caused by an environmental change.

19. A device, comprising:

a fiber having a portion of fiber cladding and a portion of underlying fiber core removed to form a flat surface;

a pair of whispering gallery mode cavities optically coupled to each other and optically coupled to said flat surface; and

a sensing unit to measure a parameter in reflected light from said pair of whispering gallery mode cavities to measure an environmental effect affecting optical coupling of said pair of whispering gallery mode cavities.

20. The device as in claim 19, further comprising a housing unit which comprises:

a chamber to hold a section of said fiber that has said flat surface and said pair of whispering gallery mode cavities, and

a movable diaphragm in said chamber to transmit pressure to said pair of whispering gallery mode cavities in response to a pressure applied to the diaphragm.

21. A method, comprising:

providing a fiber sensor in a fiber which comprises a side surface formed on fiber cladding, and at least one whispering gallery mode cavity that is in evanescent coupling with the fiber through the side surface;

exposing the fiber sensor to an external medium to cause a change at the at least one whispering gallery mode cavity;

monitoring a change in guided light caused by the at least one whispering gallery mode cavity; and

extracting information about the external medium based on the change.

22. The method as in claim 21, wherein the information about the external medium includes a temperature in the external medium.

23. The method as in claim 21, wherein the information about the external medium includes a pressure in the external medium.

24. The method as in claim 21, wherein the information about the external medium includes a presence of a selected material.